

Striving against adversity: the dynamics of migration, health and poverty in rural South Africa

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This article is a review of the PhD thesis of Mark Collinson, titled, 'Striving against adversity: the dynamics of migration, health and poverty in rural South Africa'. The findings show that in rural South Africa, temporary migration has a major impact on household well-being and health. Remittances from migrants make a significant difference to socioeconomic status (SES) in households left behind by the migrant. For the poorest households the key factors improving SES are government grants and female temporary migration, while for the less poor it is male temporary migration and local employment. Migration is associated with HIV but not in straightforward ways. Migrants that return more frequently may be *less* exposed to outside partners and therefore less implicated in the HIV epidemic. There are links between migration and mortality patterns, including a higher risk of dying for returnee migrants compared with permanent residents. A mother's migration impacts significantly on child survival for South African and former refugee parents, but there is an additional mortality risk for children of Mozambican former refugees. It is recommended that national censuses and surveys account for temporary migration when collecting information on household membership, because different migration types have different outcomes. Without discriminating between different migration types, the implications for sending and receiving communities will remain lost to policy-makers.

Keywords: *migration; temporary migration; permanent migration; refugee settlement; socio-economic status; HIV transmission; adult mortality; child mortality*

Access the supplementary material to this article: a video showing the author's official defense of his thesis, and a PDF presenting the Agincourt Health and Demographic Surveillance Systems (see Supplementary files under Reading Tools online).

This article has been commented on by Peter Mark Streatfield. Please follow this link – <http://www.globalhealthaction.net/index.php/gha/article/view/5301> – to read his Commentary.

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The study takes place in post-apartheid South Africa at a time when the South African government was prioritising a weak education system, ailing health system, stalled land reform and rural underdevelopment. Severe inequities were inherited from previous racist policies (1). An imperative exists for good public sector planning based on reliable data. Data on the dynamics of migration, livelihoods and health are presented by this study, with the aim of providing insights for policy-makers and population scientists.

The study looks at the health and well-being of households in the rural northeast. These households are often linked to the urban system through temporary migration. Temporary migration is a key migration stream in South Africa and functions as a mainstay for income and even survival of rural communities. Rural poverty remains a problem. There is vast inequity at a national level, both within and between racial groups. The 'homelands' were developed midway through the 20th century to act as labour reserves. Says Colin Bundy in 1988: 'The 1936 Land act allocated only 13% of rural

land, and the most arid, to the African people, who comprised a full 75% of the population'. Livelihoods were severely disrupted by the apartheid system, and labour migration became entrenched by a combination of government coercion and industrial labour recruitment. 'There is one feature of South Africa's industrial history that is unique. Nowhere else in the world has an industrial economy employed for so long such a high proportion of oscillating migrants in its labour force' (2).

There has been a democratic system extant for 15 years, and there is no longer a restriction on mobility, but there remain high levels of poverty and temporary migration in rural areas (3). Migration patterns did not alter after apartheid as expected. There was not a major exodus to the metropolitan areas. Instead temporary migration itself increased, the participants got younger and the proportion of female temporary migrants grew.

In rural areas the HIV epidemic is advanced and health problems of the past have not disappeared. A health transition is underway, adding a burden of non-communicable disease. There are some government services and programmes aimed at addressing poverty and developing health systems, but many communities feel neglected by the new democratic government, and development has been slow. To address this we must enhance the benefits of migration and offset the negative consequences that arise.

Aims

The overall aims of the article are to do the following:

- (a) Describe the settlement transition in South Africa, from the end of apartheid in 1994, through the period of the emergence of the HIV/AIDS epidemic.
- (b) Establish who migrated, by age and sex, using a typology of temporary migration, permanent migration and refugee settlement.
- (c) Examine the impact of migration on the socio-economic status (SES) of households left behind, and the health outcomes for migrants and their families.

Conceptual framework: a dynamic interaction between migration and health

Migration changes the health risks and resources for the migrant and linked household. The relation between migration, mortality, health, sexual partnerships and SES will be examined in this article.

The conceptual framework given in Fig. 1 is a multi-level analysis of migration and health, with variables at the community, household and individual levels. It is a dynamic perspective because migration impacts on health, SES and family structure, and as it does so it affects the likelihood of further migration, from which it follows that health, SES and family structure can change again, and so on. On the left side of Fig. 1 boxes represent the community-level factors which constrain or

enable health. These are the structural features that shape the everyday options for households and individuals. Constraints include underdevelopment and levels of disease such as HIV/AIDS, non-communicable diseases, childhood malnutrition, diarrhoea and acute respiratory infection. A limited labour market is a function of underdevelopment and a major determinant of migration. Gender roles refer to the social position of men and women which place constraints, particularly on women, in terms of ability to migrate, make decisions about health care, access legal support, own land, and so forth. Examples of health enablers at a community level include health systems; housing quality; cultural norms, which relate to behaviour expected by community; and education levels, which are expected to increase the likelihood of migration and improve SES and health.

Prior migration is listed because it has a major impact on the likelihood of further migration.

Moving rightward in the diagram, the next box represents migration which mediates the constraints and enablers listed previously. Migrants are selected for age, health and education, and these factors are linked to SES and health outcomes. This is part of the dynamic relationship between migration and health. There is a range of health risks and resources for household members at any given time, and these can be changed by migration. Examples of health risks are exposure to contagion; environmental hazards; or familial disruption, such as the separation of spouses or of a mother and child. Examples of household socioeconomic risks include retrenchment or death of a breadwinner. Resources for health include assets and income that enable household members to eat well, go to school, or reach a clinic if they are sick. Family structure is a resource through prime-age adults looking after children or older members.

Table 1 presents a matrix that highlights, by theme, the key points from each of five papers in the thesis.

Data and methods

The study population

The study population is located in the Agincourt subdistrict of the Bushbuckridge district of the Mpumalanga Province of South Africa, some 500 km northeast of Johannesburg and adjacent to the Mozambique border (Fig. 2).

In 2005, the total surveillance population was 70,527 people living in 11,988 households, with a population density of 172 persons per square kilometre. The dependency ratio was high at 0.74¹ with 11% of the population under 5 years old, 36% under 15 years of age,

¹Dependency ratio, using age as a proxy for dependence and economic productivity, has the formula of dependants (aged 0–14 and 60+) in the numerator and economically productive people (aged 15–59) in the denominator.

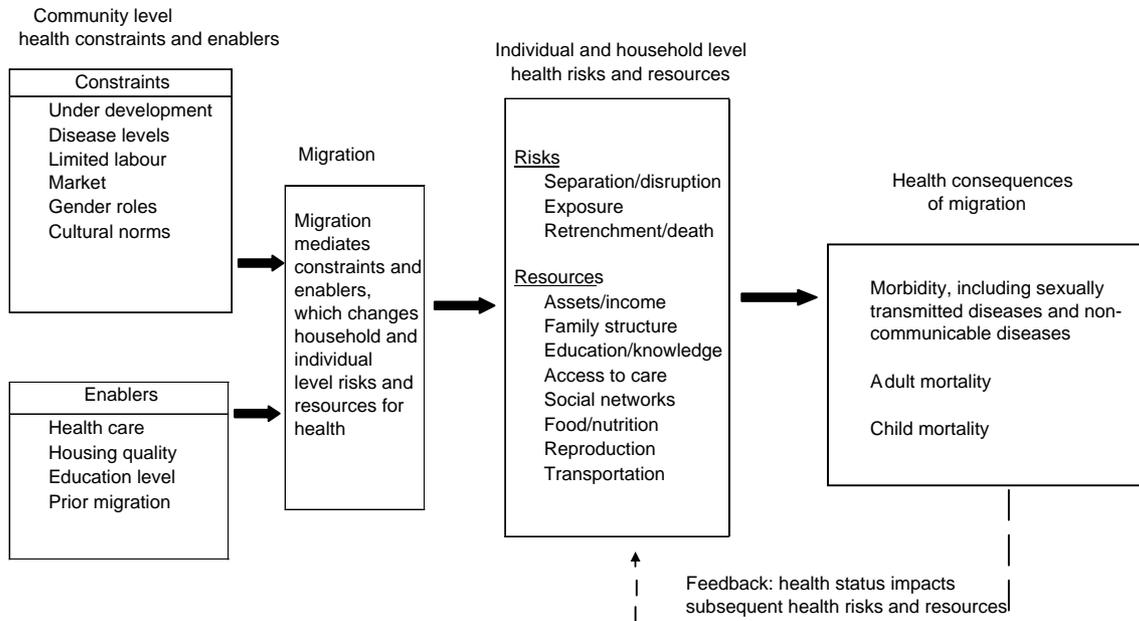


Fig. 1. A dynamic interaction between migration and health.

and 5% over 65 years.² While this is a 'young' population, there is a gradual aging trend with the percent under 10 years declining and the percent over 65 increasing. The male:female sex ratio in 2005 was 0.92. The main ethnic identity is Shangaan, with some Pedi- and Swazi-language speakers incorporated. Mozambicans comprise 30% of the total population. Mozambicans are also Shangaan speaking and are culturally affiliated to the South African host population. They arrived as refugees in South Africa in the late 1980s as a result of a savage civil war that drove people from their villages.

A fertility transition in the subdistrict is almost complete, with Total Fertility Rate (TFR) dropping from 6.0 in 1979 to 2.3 in 2004 (8). The TFR was compared with the national level in 1999 and matched well, with a TFR of 2.8. The fertility levels have declined proportionately in all age groups, including adolescents in the recent period (8). There is still, however, a high rate of adolescent fertility in the midst of escalating HIV sero-prevalence.

Mortality patterns have reversed over the last decade, with an overall trend of increasing mortality. An under-five mortality decline started reversing in 1996, and the mortality rate was still increasing a decade later, primarily due to HIV/AIDS. Mortality has also been rising in the younger-adult age group from the same cause. There has also been a rise in mortality in adults over 50, particularly women, due to strokes and congestive cardiac failure (9–11). The causes of death by age group are revealed by verbal autopsy, a field-based interview with the closest caregiver of the deceased to establish the probable cause

of death (12). In 2002–2005, the leading causes of death were HIV/TB, diarrhoea and acute respiratory infections in children under five; accidental injuries, HIV/TB and road traffic accidents in the 5–14 age group; HIV/TB, assault and road traffic accidents in the 15–49 age group; HIV/TB, vascular disease and other cardiac disorders in the 50–64 age group; and vascular disease, other cardiac disorders and neoplasms among those 65 and older (13). In the 15–49 age group HIV/TB comprised 48% of all causes of mortality.

Unemployment is high, with a strict unemployment rate of 29% for men and 46% for women using data from a labour force participation module in 2004. Formal employment involves mostly migrant men working in the mining sector (gold and coal in particular) and in construction and security firms of larger towns, as well as on nearby agricultural and game farms. Women make up an increasing proportion of the migrant labour force, employed especially in domestic work and on farms. An important source of local employment is the public sector, such as teaching, clerical or police work. Informal sector activities are widespread and include mainly selling fruit, cooked food and snacks. Pensions are an important source of income for many families. Female-headed households constitute 32% of all households.

Water shortage poses a serious problem in most villages. Levels of household sanitation are poor, and pit toilets of varying effectiveness are the norm. Roads are untarred and sometimes in poor condition. Public transport is limited to privately owned minibus taxis. Electricity and telephone services have expanded in recent years.

Primary schools are well-attended, and around half of villages have a secondary school. This is also well-

²Author's calculations.

Table 1. Indicates the key themes covered by the PhD and related articles

Themes	Papers				
	I. Settlement change and health (4)	II. Poverty dynamics and migration (5)	III. Male labour migration and HIV risk behaviour (6)	IV. Returning home to die (7)	V. Parental presence and child mortality
Male and female migration patterns	Settlement change at national and subdistrict levels	Male and female migration; settled former refugees	Male labour migration	Return migration	Parental presence/absence; settled former refugees
Data and methods	Settlement type transition matrix (national census 2001), trends in age-sex profiles (HDSS)	Household-level longitudinal model of migration and socio-economic status (HDSS)	Migration trends; subdistrict census of labour force participation (HDSS); random sample survey of migrant and non-migrant male partnerships	Event history analysis: mortality modelled by adult migration status (HDSS)	Event history analysis: child mortality modelled by parental presence and absence (HDSS)
Migration impact on socio-economic status	–	Migration impacts through causality and selection; role of remittances; grants; local employment	Employment patterns of local and migrant males	Cost burden on rural households	Family formations
Migration impact on health	Sexually transmitted diseases, adult morbidity and mortality	Increasing the socio-economic status of rural households	Separation of spouses, high-risk sexual partnerships and implications for sexually transmitted diseases	Health-seeking behaviour; socialcapital in rural households; adult mortality from HIV/AIDS and TB	Separation of parents and children; adaptation of settled refugees; child mortality

Note: HDSS, Health and demographic surveillance system.

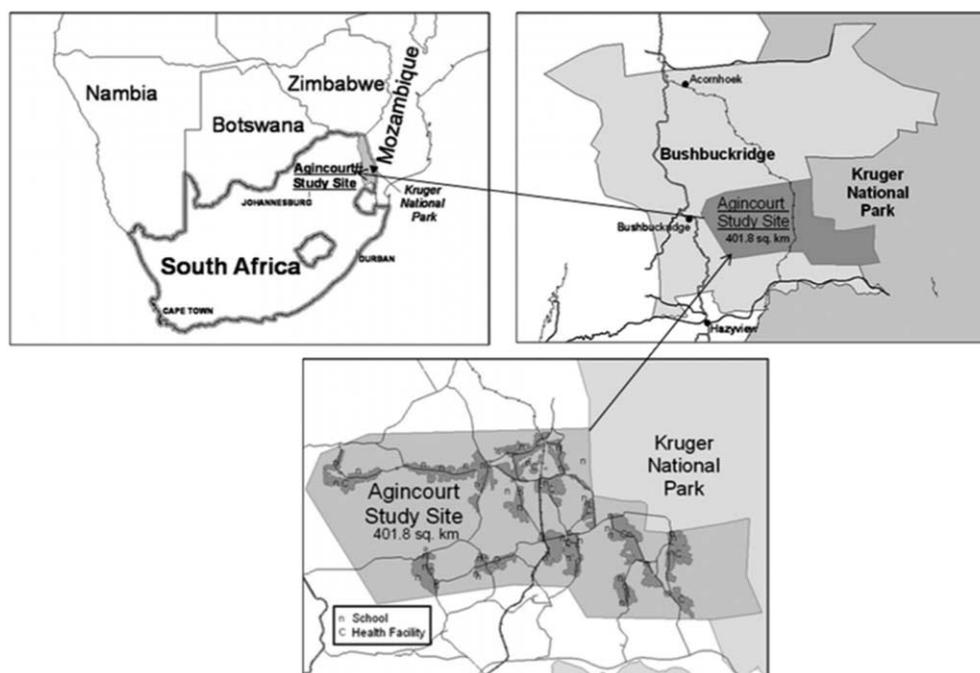


Fig. 2. Maps of the study site.

attended, but progression is slow, and half of 20-year-olds are still enrolled. Rates of illiteracy are declining rapidly over time, but are still high at a population level due to the legacy of underdevelopment.

Health and demographic surveillance system (HDSS) methods

The health and demographic surveillance system (HDSS) is used to examine migration patterns in relation to SES, adult and child mortality. The HDSS routinely updates a demographic database for the entire contiguous subdistrict population. An annual update is made of each birth, death or migration since the baseline in 1992. The annual field operation involves trained and supervised field-workers interviewing the most knowledgeable respondent available. During this interview the field-worker verifies existing records, records new data pertaining to individuals or the household, and systematically records the demographic events that have occurred since the preceding year's census update (14–16). This is supplemented by a maternity history of all in-migrant women aged 15–55 years, as well as residence histories, and other data-collection modules built into the census. A dynamic household roster showing current members is printed onto each census form in advance of the annual update. The census update is supported by geographic information system (GIS)-based maps to ensure that every household is covered. The maps are kept up-to-date by taking global positioning system (GPS) readings of new dwellings each year. A verbal autopsy is conducted on

each death to establish the cause. The verbal autopsy interview is conducted by a trained lay fieldworker in the vernacular (i.e. Shangaan), and assessed by medical practitioners to establish the main cause of death, as well as immediate and contributing causes (9, 12, 13, 17). Thus, a prospective, longitudinal database of demographic events for the entire subdistrict population has been established and regularly updated for 16 years. The database is held in Microsoft SQL Server. Data are captured using multiple trained data typists, through a custom-designed front-end, into a relational database back-end. High standards of data protection are followed, with backups made daily on the local server and off-site back-ups made weekly.

The project has a longstanding partnership with the study communities and the local health services. The University of the Witwatersrand's Committee for Research on Human Subjects (Medical) has reviewed and approved the health and demographic surveillance system research protocol (No. M 960720).

Definition of a household

A household is a group that resides and eats together, plus the linked temporary migrants who would eat with them on return. This is a de jure household definition that retains links between temporary migrants and their rural household.

Definition of a temporary migrant

A temporary migrant is a household member who is away the majority of time, but retains a significant link to their

base household and remains a household member while away. Temporary migration status is based on 'resident months' status which records the amount of time each person is physically present in the household during the year preceding the census interview. The field-worker establishes the person's residence history and determines the number of months that a person was present in the previous year. In analysis, a 6-month-per-year cut-off was chosen to differentiate 'temporary migrants' from 'local residents'.

Definition of a permanent migrant

The Agincourt definition of a permanent migrant is a person who enters or leaves a household with a permanent intention. This includes people who leave the index household and establish a household or join a household elsewhere. Within the HDSS an out-migrant is removed from the index household, and an in-migrant is added.

Cross-sectional census modules

Each year special data modules are nested within the update round to provide basic information on relevant research lines (17). In December 2008 the following cross-sectional module were available: education status (updated 1992, 1997, 2002, 2006 and new individuals), household assets (2001, 2003, 2005 and 2007), labour force participation (2000, 2004 and 2008), temporary migration (2002 and 2007), child social care grants (2002, 2005 and 2008), health care utilisation (2003 and 2006), adult physical and cognitive functioning (2006), food security (2004 and 2007) and vital documents (2005 and 2007). This article employs data from three modules: household assets, labour force participation and temporary migration.

Household assets module

A cross-sectional household asset survey is conducted every second year (e.g. 2001, 2003, 2005), in which the salient features of assets owned by households are recorded. The questionnaire contains 34 ordinal variables, covering such areas as building materials and structure of the main dwelling, access to water and power supply, and ownership of appliances, transport and livestock. For the analysis in paper (II) an absolute asset indicator is constructed by weighting each asset-variable equally in five subindicators, namely 'modern assets', 'livestock assets', 'power supply', 'water and sanitation' and 'dwelling structure'. These subindicators are combined and standardised to produce an absolute SES indicator that can discriminate between the poverty level of different households at a given time and between a particular household over a period of time. The SES indicator ranges from 0.75 to 4 from a potential distribution of 0–5.

Labour force participation module

Labour force participation modules used in the thesis were completed in 2000 and 2004. These record features of labour force participation on all de jure persons in the subdistrict aged 10 years or older. The definition of *working* and categories of unemployment were derived by starting with conventional definitions and undertaking a process of discussion and refinement with local field staff and community members.

Temporary migration module

A temporary migration census module was conducted in 2002 and 2007. People who were identified as temporary migrants were entered into the module, and a household respondent answered questions about the migration. Key areas included the duration of migration, destination, reasons for migration, return pattern, communication pattern, remittances, linked moves and child care arrangements.

Sexual partnerships data

A specialised random sample survey was conducted to analyse the sexual behaviour of migrant and non-migrant men. The study was nested within the HDSS. The sample frame came from the 1999 annual census. Fieldwork was concentrated during the major holidays and month-ends, when migrant workers were most likely to be at home. Interviews were conducted in Shangaan, the local vernacular, by a team of 12 male and two female interviewers recruited from local communities. The questionnaire was piloted and revised prior to the main phase of survey data collection. Interviewers worked independently, always outside their own villages. Respondents were asked about patterns of migration in the last year, detailed information on the main sexual partner and the most recent non-regular partner, and knowledge and awareness of HIV/AIDS in addition to background information.

National census data

The 2001 national census data was used to compare the findings of the HDSS with national migration patterns. A migration community profile was obtained from Statistics South Africa containing the 'main place' of residence and 'previous place'. A five-point settlement typology was built using the fields 'Geotypes' and 'Municipality' that classified places into metropolitan formal, other urban formal, urban informal, tribal area and formal rural. Each of these settlement types has distinct features and policy relevance in its own right. The settlement typology was applied to both 'main place' of residence and 'previous place', with the frequency of people in each cell summed from the weighted frequency provided by Statistics South Africa.

Longitudinal analysis of health and demographic surveillance system (HDSS) data

Cross-sectional data have limitations when it comes to studying dynamic systems like migration, SES and health. Longitudinal methods, namely event history analysis and household panel designs, are used in this study. In the SES study a household panel was derived from the HDSS by creating a database of household/years. For each household/year combination resident household members are evaluated. SES is a household level variable than is allowed to change over time within households and can be measured from the baseline, controlling for other key factors associated with change in the outcome variable. The mortality analyses employ discrete-time event history to estimate the likelihood of dying for resident adults and children. This method can take into account the duration-specific components of the likelihood of dying in addition to providing statistical tests of the differences in likelihoods of dying between different migrant status groups and through time. A person time file is constructed that contains one record for each time unit lived by each individual in the population. Values of the analytic variables are defined at the beginning of each person time unit. This enables estimates the hazard of death for adults and children as a function of historical period, sex, age and migrant status.

Findings

Settlement change in the period 1996–2001

Paper (I) shows that South Africa had a 4.3% increase in urban population between 1996 and 2001 (4). This is a rapid urbanisation, but a simple percentage point masks the complexity of the urban transition process. The settlement type transition matrix, given in Table 2, shows the general pattern of recent migration and settlement change in South Africa. Urban-to-urban migrations make up a majority of moves captured in the national census. All settlement types of origin had a net population loss towards the metropolitan areas, with the metropolises absorbing approximately twice the rate of people than they are losing by out-migration. The metropolitan areas gained at the expense of the secondary urban areas by four

persons per 1,000 population in between censuses. They also gained at the expense of the former homelands by three persons per 1,000 population. A movement between rural and urban settlement type occurs mostly when there is either permanent migration to a smaller settlement, or migration to a big city, while the migrant retains a rural home (i.e. becomes a temporary migrant). The out-migration from metropolitan areas is larger towards secondary urban centres than to former homeland areas. There is also evidence of secondary urban areas losing population to the ‘former homeland’ and ‘commercial agriculture’ settlement types, but this does not hold for metropolitan areas.

The next section shows that the apartheid geography of densely settled rural areas has not resulted in increased permanent out-migration to large urban areas, although some net out-migration to small towns has occurred. Temporary migration has shown major increases in males and females in ages 15–54, with the main metropolis being the primary destination. The empirical evidence shows that big cities are gaining in their share of the population, but mostly through temporary migration from rural areas as well as through permanent migration of people from secondary urban areas.

Who migrates and where do they go?

Permanent migration

Paper (I) shows that permanent migration changes a person’s usual place of residence. It does not necessarily break ties with the former household, but it does change the de jure household membership to the place of destination. At the subdistrict level the most prevalent pattern of permanent migration is within the same village or to an adjacent village. Thus, local mobility is the most frequent permanent migration. Rural villages are experiencing net population loss to nearby towns, expressly for improved services like water supply, schools and health care. The pattern of settlement change seems to be one of step-migration, where people who leave rural areas move for larger, but not the largest, places, thus reducing the extent of social and economic change accompanying the move. This implies that the migration component of urbanisation will mostly be from urban-to-urban moves.

Table 2. National level settlement type transition matrix (1996–2001). Cells contain migration rate per thousand population in the period between censuses, from the row settlement type as origin to the column settlement type as destination

	Metropolitan formal	Secondary urban	Informal urban	Former homeland	Commercial agriculture
Metropolitan formal	28	5	1	1	1
Secondary urban	9	28	2	5	4
Informal urban	1	2	1	0	0
Former homeland	4	6	1	6	2
Commercial agriculture	1	1	0	1	1

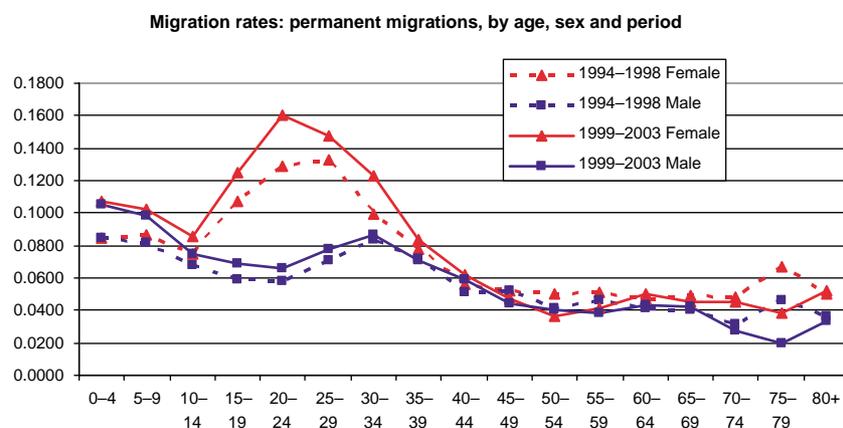


Fig. 3. Migration rates of permanent migrations into or out of field site, and moves within the site, by age, sex and period.

It also means that permanent migration is more likely to follow one of the earliest identified laws of migration, that distance is reversely related to the likelihood of migration. The key drive underlying permanent migration is family formation or dissolution (Fig. 3, Table 3).

Temporary migration

Paper (I) also shows that temporary migration is highly prevalent in southern Africa and has important impacts on social change, economic status and a whole range of health outcomes. In migration studies the ‘New Economics of Labour’ theory persuasively holds that the unit of decision-making for migration is the household rather than the individual. Households send the most capable person away to earn money, often in a distant labour market, and to remit. Despite the removal of apartheid restrictions, the level of temporary migration has increased in the 1994–2003 period, especially in young adults and increasingly among women. There is a household selection effect which implies that better-off households are more likely to send migrants since they can afford the costs of migration and also may have more connections in certain destinations (such as a city suburb) or work sectors (such as a game farm or commercial farm). In return, the migrant remits a portion of his or her salary and that becomes an income for the rural household. Thus, households are selected for sending a migrant and positively associated with household SES (Fig. 4, Table 4).

The impact of migration of household socioeconomic status (SES)

To examine the impact of migration on SES we use two regression analyses examining how household situations and migration impact on changes in SES, shown in Table 5 from paper (II) (5). We are not just looking at SES levels because we control for SES at the start of the period, so we are modelling the likelihood that a household changes their SES. The first model gives the household asset index compared to other households in

the population. The second model is a logistic regression explaining whether or not the household moves from being in the poor half to the better-off half of the population. The variable is positive when the household crosses from below to above the mean asset index. The analysis uses a migration typology because different types of migration impact differently on SES.

Permanent migration is usually not relevant for SES although there are situations where it is bad, like a father permanently out-migrating. Generally, people who move for permanent reasons don’t change much in asset ownership. People in chronic poverty still migrate to get married or divorced.

Temporary migration is linked to SES but not in straightforward ways. There is a positive association with SES which works through selection and a causal relationship which depends on the economic situation and composition of a household. The first level of selection occurs because at a national level the population is poor, remote and underserved by utilities, such as schools, health care, water, sanitation and decent roads. As people reach a stage in their lives when they need certain things but can’t get them locally they are likely to migrate. Selection then determines who is most likely to migrate. Young adults are most likely to migrate, and this is the same pattern throughout the developing world. Circular temporary migration implies routinely moving from home to workplace and can continue over years. For men the age pattern of high circular migration is 20–59 years and for women 20–49 years.

Gender is important because males have a tradition of migrating to work and are usually the main earners in families, but there is in addition a positive selection towards motivated and educated young women to access opportunities and gain more freedom from the traditional rural society. One of the main changes in migration pattern since the onset of democracy is that younger men and women in the 20–25 age group are increasingly likely to migrate. After controlling for the endogeneity in the

Table 3. Destination and origin types of permanent in- and out-migration, in and out of the Agincourt study population, 1992–2003

Destination/Origin category	Number of out-migrations	Percent (%)	Number of in-migrations	Percent (%)	Sum of in and out-migrations	Net-migration	Ratio of net-migration to out-migration
Village to village moves	40,457	72	40,290	79	80,747	-167	0.00
Nearby towns	6,067	11	2,686	5	8,753	-3,381	-0.56
Secondary urban	4,670	8	4,012	8	8,682	-658	-0.14
Primary metropolis	2,298	4	1,550	3	3,848	-748	-0.33
Other and unknown	2,996	5	2,357	5	5,353	-639	-0.21
Total	56,488	100	50,895	100	107,383	-5,593	-0.10

regression there is still a burden associated with declining migration and improved SES associated with improved temporary migration. Hence temporary migration has a causal impact on SES, primarily due to remittances. Households in the poorer half of the population are stratified, with some transitioning out of poverty and others remaining in chronic poverty. The households that transition out of poverty are those that can send a migrant. Female migration is a key strategy for poorer households. Female migrants are more likely to come from female-headed households which are more likely to be in the poorer half of the socioeconomic spectrum. For the poorest households the most important factors improving SES are government grants and female temporary migrants, while for better-off households male temporary migrants and local employment are the most important factors.

It is vital to see that impoverished communities like Agincourt are not homogenous, and former refugee households are the particularly vulnerable. Structural, social and cultural barriers prevent an equal flow of access to resources for former refugees. The division of the population into wealth quintiles shows a high proportion of the former refugee households in the poorest quintile. There is poor infrastructure, livelihoods have been severely disrupted, and there is a deprivation associated with lack of integration and legal status. Ongoing research is needed so that an appropriate policy response can be made and these communities properly integrated.

A study on migration, sexual partnerships and HIV

In 2008, South Africa had 11.7% of its population living with HIV. This is an enormous burden of disease, with 5.7 million infected and many times more affected. The adult (15–49) national prevalence rate is 18%, although there is a wide differentiation between different parts of the country, with metropolitan areas highest. The first cases of HIV/AIDS mortality in the Agincourt population were diagnosed by verbal autopsy in 1993 (18). Since then there has been a catastrophic rise in the number of deaths from this cause, from 71 deaths in the 1992–1994 period to 2,304 deaths in the 2001–2003 period, giving a relative risk of 32.3 with *p*-value 0.000 (17).

Migration is a risk factor for increased likelihood of high-risk sexual partnerships which places households of origin at risk. One of the key factors driving this is the selection itself, which means that the migrants as individuals may have more risk-taking tendencies. Another factor is spousal separation, which results in sexual relations outside marriage or long-term committed relationships. Thirdly, the change in context mediated by the migration is different for males and females, but both are at risk of outside sexual partnerships. For both sexes this can be related to lax social controls away from the more conservative rural environment. In addition women

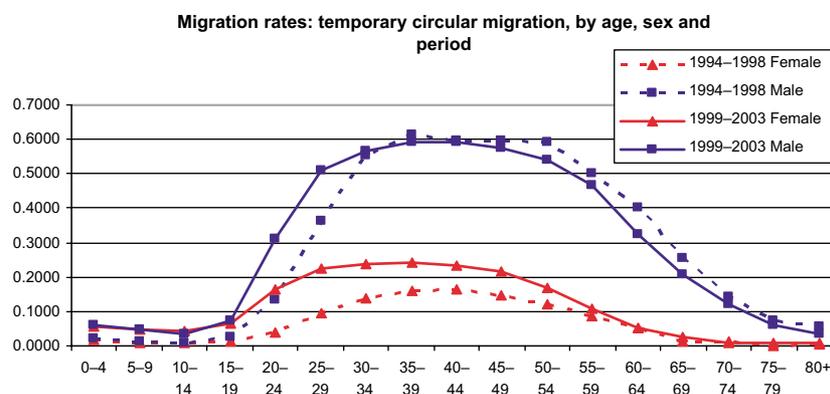


Fig. 4. Migration rates of temporary migration, by age, sex and period; rates were produced annually and averaged over the period.

can be exposed to transactional sex, or having boyfriends for economic reasons, and men exposed to environments where risky behaviour is condoned or encouraged.

The relationship between migration and HIV is examined in paper (III). The hypothesis is that migrants, both male and female, are more exposed to high-risk sex and can infect their spouses or regular partners on return. The findings support the hypothesis that migration plays an important role in the spread of HIV, but it is not a straightforward relationship. The study presents evidence from a special survey that interviewed migrant and non-migrant men about their sexual partnerships in Agincourt. Amongst employed men those based in the rural area demonstrated a higher likelihood of multiple partnerships (52%) compared with migrant counterparts (44%), $p=0.075$ when controlling for ever worked away, age, education, marital status and Mozambican nationality. Local, unemployed men (who are mostly in the age group 20–29) report the fewest partners of all. A key stratifying characteristic of migrants was the frequency of return home. The majority of men working in nearby destinations such as game parks or commercial farms report fewer partners than either the long-distance migrants (who return once or twice a year), or resident employed men. Migrants are at higher risk of infection, and spousal separation increases the risk of sexual

networking in the sending area, which increases risk at both ends of a migration cycle. Migrants who return more frequently, indicating closer links between migrant and rural household, may have less risk of outside partnerships and therefore less risk of becoming infected, and possibly passing on, the human immunodeficiency virus HIV. Migrants that are more closely connected to home may be less exposed to outside partners and therefore less implicated in the HIV epidemic. This is a different conclusion to much of the literature linking migration and HIV transmission which puts the blame on the migrant and relates frequent returns home with an increased risk of spreading the disease in the rural area. Since temporary migration is inevitable, more contact is needed between the migrant and their rural home which can reduce risks of acquiring sexually transmitted diseases (STDs).

Two studies on migration and mortality

Two longitudinal mortality studies were undertaken with Agincourt HDSS data looking at child (0–5 years) mortality and adult (15–65 years) mortality with respect to migration exposure.

Migration and adult mortality

Paper (IV) (7) examines the hypothesis that return migration to rural households is associated with advancing illness and death, particularly from HIV/AIDS, adding a burden to families and the health system in rural areas. A longitudinal (event history) analysis was used to investigate the risk of dying for returnee migrants compared with permanent residents or returnees from more than 5 years ago. Analyses were carried out for an earlier (1992–1997) and a later (1998–2004) period. Controlling for period we found that recently returned migrants have a significantly higher risk of dying, with odds ratios between 1.1 and 1.9 depending on age and sex category, compared with residents or long-term returnees. An exception is male returnees aged 60–79

Table 4. Destination of circular, temporary migrants, both sexes, 2002

Temporary migration destination	N	Percent (%)
Village-to-village moves	212	2
Nearby towns	1,277	11
Secondary urban	4,936	41
Primary metropolis	5,588	46
Other unknown	48	0
Total	12,061	100

Table 5. The dynamics of poverty, migration and other household factors between 2001 and 2005

Factor	Level	Percent		Model 1	Model 2
		<i>n</i>	(%)	Ordinary least squares regression Coefficient: SES absolute	Logistic regression Odds Ratio: less poor half
SES level at start				0.45 (0.44, 0.47)***	14.02 (12.24, 16.06)***
Male adult temporary migration in household at start of period	No male temporary migrants	5,675	51	Ref	Ref
	1 male temporary migrant	3,945	36	0.04 (0.03, 0.05)***	1.25 (1.11, 1.41)***
	>1 temporary migrant males	1,507	13	0.03 (0.01, 0.05)***	1.34 (1.12, 1.6)***
Change in male adult temporary migration in household	No change	5,911	53	Ref	Ref
	Increase	3,753	34	0.01 (0, 0.03)*	1.12 (1.01, 1.25)**
	Decrease	1,463	13	-0.04 (-0.06, -0.02)***	0.82 (0.69, 0.99)**
Female adult temporary migration in household at start of period	No female temporary migrants	8,265	74	Ref	Ref
	1 female temporary migrant	2,218	20	0.03 (0.02, 0.05)***	1.26 (1.05, 1.5)**
	>1 temporary migrant males	644	6	0.03 (0, 0.07) [†]	1.42 (1.07, 1.88)**
Change in female adult temporary migration in household	No change	6,785	59	Ref	Ref
	Increase	1,835	16	0.03 (0.01, 0.04)***	1.12 (0.99, 1.27)**
	Decrease	2,920	25	-0.03 (-0.05, -0.01)***	0.74 (0.61, 0.89)***
Grants received by household at start of period	Nil	9,513	81	Ref	Ref
	1 grant received	1,866	16	-0.01 (-0.02, 0.01)	0.85 (0.75, 0.97)**
	>1 grants received	375	3	0 (-0.03, 0.03)	0.78 (0.58, 1.07)
Change in number of grants received over the period	No change	5,164	44	Ref	Ref
	Increase	6,258	53	0.04 (0.03, 0.05)***	1.11 (1.02, 1.21)**
	Decrease	332	3	-0.03 (-0.06, 0.01)	0.79 (0.57, 1.08)
household members employed locally at start of period	Nil	7,438	63	Ref	Ref
	1 locally employed	3,117	27	0.05 (0.03, 0.07)***	1.34 (1.17, 1.53)***
	>1 locally employed	1,199	10	0.08 (0.05, 0.1)***	1.72 (1.33, 2.21)***
Change in number of household members locally employed	No change	6,494	55	Ref	Ref
	Increase	2,867	25	0.03 (0.01, 0.04)***	1.25 (1.08, 1.45)***
	Decrease	2,393	20	-0.05 (-0.07, -0.03)***	0.76 (0.65, 0.89)***
Household size at start of period	1-3 members	3,132	27	Ref	Ref
	4-8 members	6,017	51	0.05 (0.03, 0.07)***	1.22 (1.07, 1.38)***
	9+ members	2,637	22	0.06 (0.03, 0.08)***	1.38 (1.17, 1.63)***
Gender of household head at start of period	Female	3,823	34	Ref	Ref
	Male	7,318	66	0.03 (0.02, 0.05)***	1.3 (1.16, 1.46)***
Nationality of household head at start of period	Mozambican	3,093	28	Ref	Ref
	South African	8,048	72	0.13 (0.11, 0.14)***	1.9 (1.71, 2.1)***
	Constant			1.11 (1.08, 1.14)***	

Note: 95% confidence interval: (lower bound, upper bound); Statistical significance.

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

years, who show a lower mortality than the residents. They have the double advantage of being positively selected on the basis of health as out-migrants (healthy migrant hypothesis) and have survived the selection process that has eliminated less healthy male migrants over their working lives. They may also be less likely to be HIV infected due to their older age.

Migration and child mortality

In paper (V) the hypothesis is examined that the configuration of the household has an impact on child mortality, net of classical risk/protection factors such as SES, mother's education, access to clean water, household size, child's age and sex, and time period. The results show an important relation of family configuration to

child mortality. The presence and absence of fathers plays a significant role, but varies by the type of father's migration. When he leaves permanently it is equivalent to him being dead and, controlling for other factors and family configurations, this results in a 90% higher risk of mortality. The separation between fathers and children when the mother is at home does not impact on children's risk of mortality if they are temporary migrants because the benefit of the remittance income outweighs the loss of parental care. The impact of absent fathers is felt by 48% of children in the community. This finding shows the importance of discriminating temporary from permanent migration because when fathers are temporary migrants there is no risk of higher child mortality compared with households where the child coresides with both mother and father.

When mothers migrate there is the potential of increased burden of health and even mortality of children, irrespective of the father's migration status. Mothers are very much more likely to be physically present with their under five children, but if not there is a big difference between whether the mother is a temporary migrant, lives elsewhere, or is dead. Maternal temporary migration is 250% worse for child mortality, while maternal death results in more than a five-fold increase in child mortality. If a mother lives elsewhere, the increase in child mortality is double, but the confidence intervals are so wide that the result is not significant. This category is inconclusive because there are two main types of configuration where the mother lives elsewhere and they can have good or bad effects. The appointed caregiver may not pick up the signs of illness as quickly nor make as much effort to get the child to health care. There may be risk of injury that increases due to less-vigilant observation of children's behaviour. In the longer run there may be nutritional deficiencies associated with non-biological parenting that can make children more prone to ill-health.

Settlement of former refugees

It is within some of the poorest populations of the world that forced migration occurs due to conflict or environmental hazard. Thus, there is a negative selection at work in forced migration. In the time of civil war the whole population age structure moves and not just the prime-age adults. Whole villages can be forced to migrate which is a different pattern to the positive health selection that characterises young people leaving a stable home and staying linked while they are away. By the time the refugees had settled in South Africa the degree of positive selection had increased due to the arduous of the journey impacting more severely on the frail migrants. Paper (V) shows that children of former Mozambican refugees have a significantly higher risk of

mortality (34%) even after all the other risk factors and family configurations have been controlled for. Settlements of Mozambican former refugees continue to be extremely poor. There remains a higher mortality risk for children of Mozambican parents due to negative selection, severe disruption, compromised legal status and unhealthy environments at the destination.

Regional mortality data support the decision of former Mozambican refugees staying in South Africa. When comparing child mortality with people living in rural Mozambique. With infrastructure collapse in the civil war and underdevelopment, mortality rates are high. In a study the former refugees had a higher under-five mortality rate (64 per 1,000) than South African children (48 per 1,000) in rural South Africa, but the mortality conditions are still better than their counterparts who remained in Mozambique, who experience an even higher mortality rate of 201 per 1,000 (19).

Poverty and remoteness are problems for former Mozambican households, but some early indicators of assimilation are in place. The question of assimilation looks at whether the health trajectories of the in-migrants adapt to become like the hosts once they have arrived in the new conditions. There has been modest improvement albeit from a very low base. Evidence of assimilation include the fact that children born to Mozambican parents living in mixed communities had a better survival chances than those born in former refugee villages (20). Movement out of the former refugee villages was associated with an improvement in child mortality rates. Mortality has also reduced for former Mozambican refugees in the field site since they arrived. Thus, despite negative selection and vulnerability there has been assimilation from a health perspective.

A comparison of migration rates between the Mozambican and South African households also shows assimilation. Permanent migration patterns are very similar in the Mozambican and South African households. Temporary migration rates are the same (both are high, but with significant sex differences). The Mozambican temporary migrant men are much more likely to leave the spouse behind in the rural area, while South African women are encountering more of the modern discourse, experiencing new gender roles and using the existing migrant networks to access education or work opportunities in cities or farms. Mozambican households in South Africa are constrained by the same environment as the poor South Africans, making the patterns of migration similar in the South African and Mozambican households. As with the South African households it would be the relatively better off households that could send a temporary migrant. Also, risks of STD and sick migrants returning home to die exist for settled refugee households.

Discussion

The study shows that migration changes the risks and resources for health with positive and negative implications. Health services need to adapt to a reality of high levels of circular migration. In the past health budget allocations have been apportioned according to the de facto population distribution given in a national census. To account for sick migrants returning home to die we must increase the allocations for the district hospitals and health centres. Information systems are needed so that clinicians in district hospitals can access basic patient records from urban environments. Health care services in working environments can provide referral letters for persons with chronic illness in case they need to receive medication in rural settings. Generally, barriers to health care should be low so that migrants of all types can access preventative and curative services. Family and extended family networks are needed to support children while the migrant is away. More frequent encounters between migrant and home is important, which can be achieved with better road and transport networks. The intervention may tend to increase migration, but this should be seen as a positive, not a negative outcome.

Temporary migration is potentially the most beneficial as well as the most harmful form of migration, an intensity which is higher for women than men although it affects both sexes. Some migrants are positively selected and others have no advantages but strive against adversity. There are higher risks attendant on temporary migration than on other forms of migration. The risks for men are particularly STDs, workplace infections and injuries. Women increasingly face these risks too, but in addition may be forced to migrate under more impoverished conditions. Women's migration is riskier as evidenced by the consequences on child mortality, but the income for poor rural households is an important reward. Working female migrants are more likely to send remittances than working male migrants. The female migration tends to reduce the inequity within the population by providing livelihoods for the most impoverished households.

Data should be enhanced at a national level by accounting for temporary migration in national censuses and surveys. National data needs to show temporary migration patterns. The national perspective is important because policy-makers need to understand how settlement patterns are changing over time and what the implications are for social change, poverty and health. We have seen, however, that national datasets are hampered in migration monitoring because it is hard to identify temporary migration. This means that some key policy issues are missed at a time when it is critical to see how the dynamics work. High levels of HIV and temporary migration mean that the health services remote from the main centres are very likely to pick up a lot of HIV illness.

Also, rural households are burdened by the loss of a bread winner and the return migration of a sick household member. Censuses and national surveys should be adapted to pick up circular migration to enable better planning.

Health and sociodemographic surveillance can help to establish the dynamics of migration which can be triangulated with the national picture. The limitation of the HDSS is one of representivity, and it is not clear that policy-makers can infer national trends from subdistrict data. There are however analytic approaches that help to resolve some of the representivity issues. The findings from HDSS are rendered more informative when combined with findings from other HDSS sites. The INDEPTH Migration and Urbanisation Working Group used HDSS data from seven HDSS sites in six countries in sub-Saharan Africa and Asia to study the health and socio-economic implications of migration (21).

There are limitations to the HDSS method, for example, the ability to extrapolate findings to a wider population. Agincourt represents a typical former 'Bantustan' area in South Africa's interior provinces. For broader extrapolation comparative studies other settings are needed. One type of comparison is with national datasets another is comparison between HDSS sites which is the domain of multisite studies in the INDEPTH Network.

Conclusion

Poorer parts of the world continue to send migrants to better-off parts, be it a town, a city or another country. Usually poor migrants are positively selected sojourners who are vital for the economic well-being of the households and communities left behind. To plan for this situation data are needed at a national level, so it is recommended that national censuses and surveys account for temporary migration when collecting information about household membership; otherwise the implications for sending communities will remain lost to policy-makers. At the individual level we can offset many negative consequences by treating poor migrants as people striving against adversity, rather than as unwelcome outsiders in our better-off communities.

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